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Bedbugs

LEAFLET No. 146

U.S. DEPARTMENT
OF AGRICULTURE

BEDBUGS

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The mature, well-grown bedbug (*Cimex lectularius* L.) is a wingless brown insect, between one-fourth and three-eighths of an inch long, with the shape of the unfed specimen shown in figure 1. When engorged with blood, the body loses its paper-thin appearance and becomes more elongated and swollen, as shown in figure 2, and the blood within its body gives it a more reddish appearance. The differences in shape, due to the amount of food the body contains, often lead to the inquiry as to how many kinds of bedbugs infest American homes. There is only one species that habitually attacks man and establishes itself in his living quarters in numbers warranting control measures. This common bedbug is often called also a "chinch", "red coat", or "mahogany flat." It has never been proved that bedbugs serve as disease carriers in the United States.

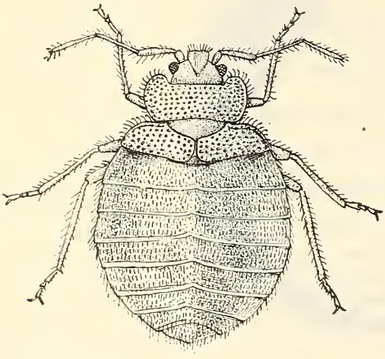

FIGURE 1.—Dorsal view of mature bedbug before engorgement. Much enlarged.

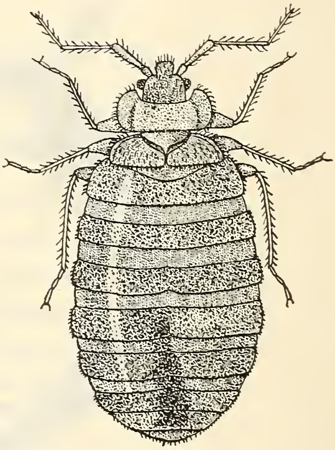

FIGURE 2.—Dorsal view of mature bedbug engorged with blood, showing distention of body and altered appearance. Much enlarged.

How Bedbugs Feed Upon Man

Bedbugs are sucking insects. Their mouth parts are modified to form an elongated sharp beak or proboscis which can be thrust into the skin and through which blood can be drawn (fig. 3). It requires a well-grown bedbug from 3 to 5 minutes to become engorged with blood if its feeding is unmolested. Once filled to capacity, the bug withdraws its beak and quickly crawls to its hiding place, where it

Issued October 1937.

remains for several days digesting its meal, seemingly indifferent to its host. When hunger finally reasserts itself, the bedbug seeks out its host for another meal.

Food of Bedbugs

The food of bedbugs is the blood of warm-blooded animals, principally of man. Sometimes bedbugs become very abundant in hen houses, where they feed upon poultry at night. Rabbits, guinea pigs, white rats, canaries, and other pets may be weakened by loss of blood due to bedbug attack.

Many believe that bedbugs develop in trees and can subsist on sap, or on the dried juices of seasoned wood in houses, but there is no evidence that this is true. Moreover, bedbugs cannot eke out a subsistence from dirt in floor cracks and other places in buildings. A very persistent belief that is without foundation is that old pine wood breeds bedbugs.

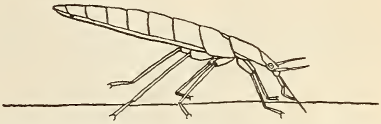

FIGURE 3.—Diagrammatic view of a bedbug in the attitude of feeding upon man. Note the proboscis puncturing the skin.

When Bedbugs Feed

Bedbugs are normally nocturnal. When the lights are out they emerge from their daytime hiding places and seek to feed upon their host. Sometimes, when very hungry, they will feed during the daytime in subdued light. Their normally nocturnal habit is modified necessarily when they infest furniture in rest rooms in stores, theater seats, desks in offices, and similar situations that are not frequented by man throughout the night. In such places bedbugs often bite persons during the day.

Irritation Caused by Feeding

When bedbugs bite, they inject a fluid into the skin of their host which assists them in securing blood. In many instances the bite results in no irritation and many persons are blissfully unaware that they have been bitten. Only too often, however, the skin is greatly irritated by the biting process, and inflammation and welts develop, accompanied by much itching.

Bedbug Odor

The offensive odor associated with heavy bedbug infestations of considerable standing is the result of an oily liquid emitted by the insect from two scent glands. These glands open by two separate orifices on the under side of the thorax between the bases of the second and the third pair of legs on each side.

How Bedbugs Are Distributed

Bedbugs are distributed in many ways. They crawl freely between their victims and their hiding places but do not migrate from room to room or from house to house as freely as many have believed. Probably clothing, baggage of travelers and visitors, secondhand furniture, and laundry done in private homes are the chief means of spread. Operators of public gathering places find it necessary to guard their furnishings from bedbug infestations brought unwittingly to their establishments by patrons.

Normal Development

The mature female bedbug, under favorable conditions, is said to live from 6 to 8 months and may lay as many as 541 eggs, although 200 eggs is probably a fair average. When temperature and food conditions are favorable these are laid at an average rate of three or four a day. No eggs are laid at temperatures lower than 50° F. and very few between 50° and 60°, while maximum oviposition occurs only above 70° and when the female has ample opportunity to feed. Starved females soon stop laying eggs.

At temperatures above 70° F. the eggs hatch in 6 to 17 days. At lower temperatures they may not hatch for 28 days. The eggs are white, about one thirty-second of an inch long, are shaped as indicated in figure 4, and at first are coated with a mucilaginous substance which forthwith dries, sticking them to the object upon which they are deposited. The unhatched eggs and the milk-white eggshells are seen singly or in clusters about the crevices or hiding places where bedbugs congregate.

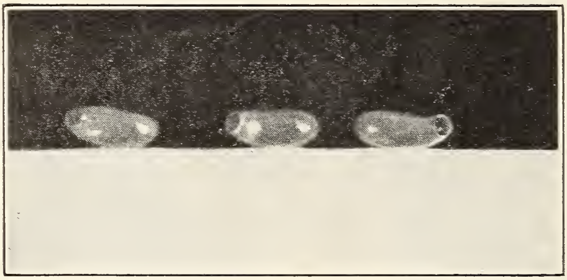

FIGURE 4.—Eggshells of bedbugs, shown in profile, attached to the edge of a sheet of paper. Much enlarged.

The newly hatched translucent and nearly colorless young bedbug (fig. 5) feeds at the first opportunity. During growth the young bedbug closely resembles the parent insect. It molts or sheds its skin five times in reaching maturity. It must feed after each molt in order to grow and molt again (fig. 6). The cast skins (fig. 6, *A*) are white and fluffy and often accumulate in piles in spaces about window and door frames or in the cracks where bedbugs hide. Full nymphal growth requires from 4 to 6 weeks during warm summer weather or in houses continuously heated. One bedbug that hatched on January 30, 1937, was kept in a room in which the temperature was above 70° F. It was given an opportunity to feed on human blood each day. It fed on January 30 and on February 4, 9, 15, and 23. It molted on February 3, 8, 12, 19, and 28. After becoming mature through its molt on February 28, it did not feed until March 17.

This individual record is probably typical of the development of young bedbugs under ideal temperature and food conditions and agrees closely with the growth of other specimens hatching at the same time. There may be three or four generations, or even more, a year in the average house. Owing to variations in the period of development, even among bedbugs hatching at the same time, the generations become hopelessly confused, and all stages are present at all seasons of the year, except in unheated rooms, in which the insects overwinter mostly as adults.

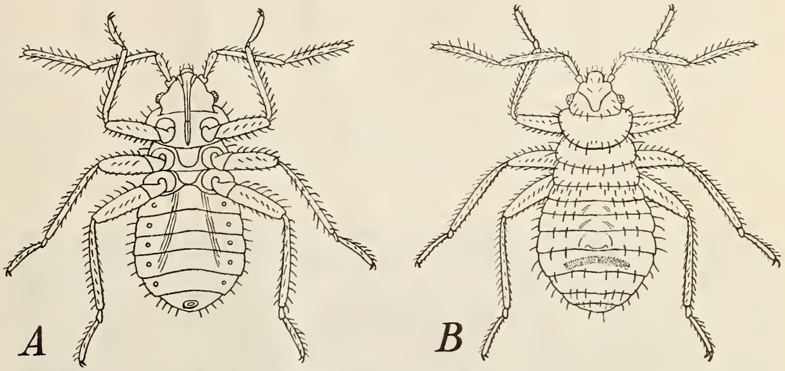

FIGURE 5.—Newly hatched bedbug larva: *A*, Larva from below: *B*, larva from above. Much enlarged.

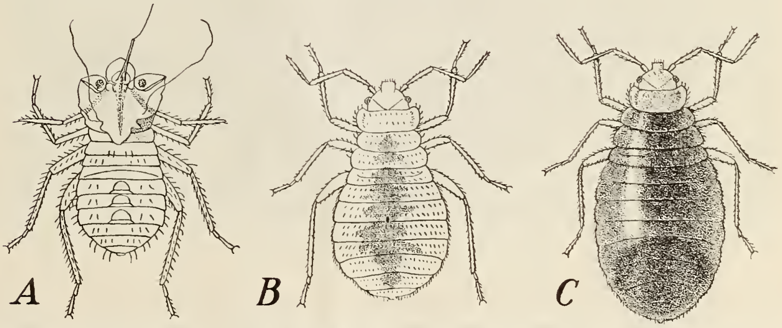

FIGURE 6.—The bedbug: *A*, First larval skin shed at first molt; *B*, second larval stage taken immediately after emerging from *A*; *C*, same after first meal, distended with blood. Much enlarged.

Starvation and Its Effect on Length of Life

Much interest centers upon the length of time bedbugs can live, especially without food, because of the bearing this information has upon the survival of infestations in unoccupied houses and the insect's ability to remain alive without food in situations where it may be carried accidentally but where it finds no food. It has been stated that bedbugs can survive at least 1 year under starvation conditions. When normally fed and laying eggs, individual bedbugs have lived from 54 to 316 days. It is common for older bedbugs to go 2 weeks to 2 months without food. At 82° to 89° F. newly hatched bedbugs have survived unfed up to 18 days, while at 60° to 65° they have lived 136 days unfed and 9 months when given a chance to engorge once.

Young mature bedbugs kept at 71.6° F. under starvation conditions have lived 20 to 38 days. Evidently there is great difference in individual hardiness, and the chances for long life are influenced much by opportunity to feed. Growth, when food is available, is greatly prolonged by periods of adverse temperature. It is said that bedbugs are able to live throughout a severe winter in unheated structures.

Control

In combating bedbugs, first find where they are secreting themselves during the daytime. When first established in a room they are apt to hide about the tufts or seams of the mattress or day bed and later in the cracks and crevices of the bedstead. Upon becoming more numerous or after the housewife has been fighting them in a haphazard manner, the bugs usually become scattered and establish themselves behind baseboards, window and door casings, pictures, picture moldings, and loosened wallpaper, or in cracks in the plaster. Partitions of composition board or sheathing are ideal for bedbugs, for usually there are many cracks about the unions in which bugs can hide. Bedbugs do not crawl into the wall spaces for hiding to any great extent. They hide usually on a flat surface just away from the bright light. Bedbugs seem to develop a shrewdness in finding openings in which to elude the housewife, and she, in her search, should look with suspicion upon all cracks and openings as possible and likely places of concealment and egg laying.

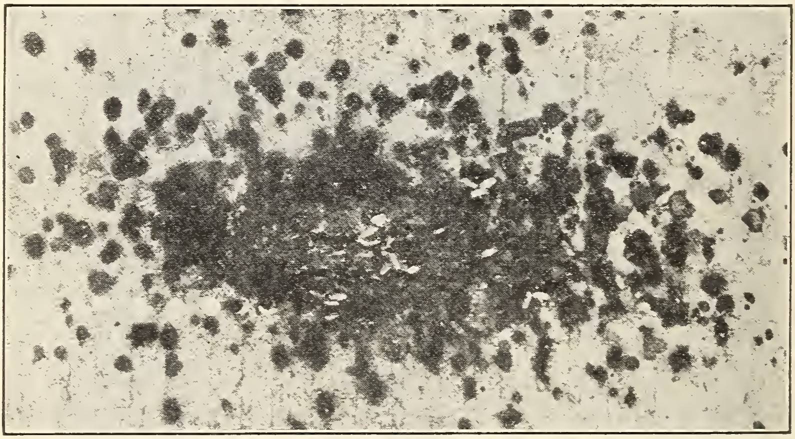

FIGURE 7.—Patch of excretal stains, which always indicate bedbug hiding places.

Habitual hiding places of bedbugs are usually made evident by the disfiguring spots that stain surfaces upon which the bugs rest. These black or brown spots of irregular shape (fig. 7) are the dried excrement of the bugs, and they always indicate that bedbugs are, or have been, present in that place. The daytime congregating places of bedbugs are usually close to the victim's sleeping quarters and are easily detected.

Fumigation.—There is no better way to stamp out an infestation quickly than by fumigation. A fumigation of 12 hours or more is desirable, although in rooming houses, or in homes that cannot be vacated for 12 hours, excellent results have followed fumigations of only 2 to 4 hours. Of the fumigants now commercially available, hydrocyanic acid gas is particularly effective when used in detached vacated buildings. *Because it is so deadly to human beings it should be used only by a well-informed person, preferably by a professional fumigator or exterminator working under a license issued by the local health department.* In the hands of such a person, short fumigations in auto camps, trailers, rooms, etc., can be effectively done with little interference with business or inconvenience to householders, and there is no disagreeable odor or the necessity for exasperating and frequently repeated applications of smelly liquids. There are safer fumigants than hydrocyanic acid gas, but none are available that kill so effectively in the average none-too-tightly constructed dwelling.

Professional insect exterminators can fumigate, with safety, individual rooms in congested areas with one of the reasonably safe mixtures of carbon dioxide with ethylene oxide, methyl formate, or methyl bromide, provided certain precautions are taken; these carbon dioxide mixtures can be used in treating an infested apartment without the evacuation of the entire building. Fumigation with sulphur dioxide, liberated during the burning of 2 pounds of sulphur for each 1,000 cubic feet of space treated, is easily available to anyone; however, it will tarnish all metals not removed or coated with vaseline, and is so apt to bleach delicate colors in fabrics and wallpaper that it should not be employed unless these possibilities of injury are taken into consideration. *The Bureau of Entomology and Plant Quarantine will give information regarding fumigants suitable to any situation, provided local conditions are explained clearly in correspondence.*

The advantage that effective fumigation has over the application of sprays and liquids is that the vapors enter the cracks and crevices and kill the bedbugs and their eggs. In reasonably well-constructed rooms, one fumigation usually destroys all the insects. When fumigation is out of the question—and a very large percentage of the population are prevented from fumigating because of their location or because of prohibitive costs—dependence must be placed upon liquids or sprays and heat.

Superheating.—Heating rooms and even entire buildings to a temperature of 120° to 125° F. for several hours will completely eliminate bedbug infestations. Superheating has been resorted to repeatedly with success during hot summer weather when advantage can be taken of the normally prevailing high temperatures. In summer, most home heating equipment is sufficient to raise the temperature of infested rooms to 120° to 125° F., if not higher, without harm to furnishings. It is well to place thermometers in various parts of the room or rooms in order to note the temperature obtained. The temperature in the cracks where the bugs are secreted must be held as high as 120° F. for several hours. In loosely constructed frame buildings it may not be possible to secure a killing temperature at points close to wall spaces. Some institutions, such as colleges operating dormitories, find the heat treatment effective and cheap.

Use of sprays.—Ordinary fly sprays (which can be home-made or purchased at stores), consisting largely of high-grade, water-white kerosene, practically stainless, with small additions of pyrethrum extract, are dependable for the destruction of bedbugs and their eggs. They must, however, be brought into contact with the bugs, and to accomplish this nothing is better than power sprayers operated by professional insect exterminators. The ordinary hand sprayer, such as can be purchased at stores for about 25 cents, is useful in applying solutions, but the force behind such applications is not equal to the driving force generated by the power sprayer operated by an experienced person. Vaporizing machines which fill rooms with a mist or fog of insecticide are not ordinarily dependable for quickly stamping out bedbug infestations.

Hand application of liquids.—When no equipment for applying sprays is at hand, much good can be accomplished by using a large feather or small brush to apply kerosene, turpentine, benzene, or gasoline to cracks of bedsteads and other hiding places of the bugs. While these hand applications are tedious and smelly and call for persistence and intelligence, they can be made thoroughly effective at practically no expense aside from the cost of the liquids. *When using these liquids, keep the windows open and all fire away during the period of application, otherwise fire or explosions may occur.* A good bedbug solution for home application, in use for years, can be made as follows: One ounce of corrosive sublimate (mercury bichloride) dissolved in 1 pint of alcohol, to which is added one-fourth pint of turpentine. *Corrosive sublimate is a poison; it should be used with care and never applied to substances which might be chewed by young children or pets.*

Treating infestations in upholstered furniture.—Infested overstuffed furniture can best be rid of bedbugs by fumigation, either in connection with a general fumigation of the house or in the vault of a dependable storage concern or insect exterminator. Such vault-fumigation services are available at reasonable rates in most cities. If such services are not available, the furniture should be placed on an open porch or in a shed and the parts affected treated with liberal applications of clear gasoline. Very frequently the early elimination of bedbugs from upholstered furniture, where they have become established after having been brought into the home on clothing, prevents room infestation.

Community effort toward control.—If city dwellers living in apartment or row houses could realize what a protection a general fumigation of the entire building or row, or a specially safeguarded fumigation of any particular apartment or house, is to surrounding occupants, the bedbug problem could be solved satisfactorily by fumigations. The haphazard treatments given by many, and the indifference of others even to heavy infestations, make possible the spread of bedbugs to adjoining houses and apartments. Apartment operators are often placed at a disadvantage in control work by the lack of cooperation of all apartment dwellers. Many do not realize that the destruction of insects in one apartment is to the advantage of all other apartments in a building. The bedbug nuisance could be greatly abated by community effort.

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